Rad Hard Non Volatile Memory for FPGA BootLoading, Phase II
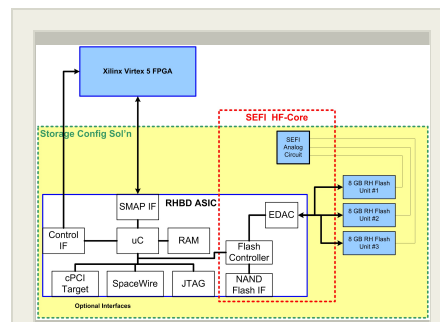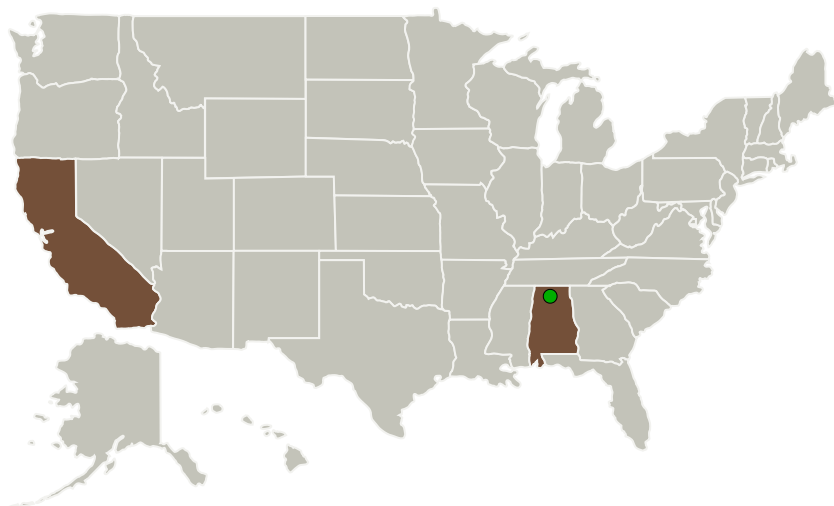
Completed Technology Project (2014 - 2016)

Project Introduction

Radiation-hardened non volatile memory (NVM) is needed to store the golden copy of the image(s) has not kept pace with the advances in FPGAs. Consider that a single image of a Xilinx V5 FPGA typically is roughly 50 Mb large. If a designer wants to store several such images in a satellite, then a sizable amount of highly reliable, radiation-hardened memory is needed. Traditional Rad hard memory for space (CRAM, FRAM, MRAM) is not sufficiently dense and extremely expensive. As a consequence, there exists a clear need and market opportunity for highly reliable, higher density, NVM for storing program code, calibration tables and images of reprogrammable FPGAs. The goal of this SBIR project is to develop a highly reliable and fault-tolerant, radiation-hardened hermetic memory multi chip module (MCM), which can be used to configure and scrub reconfigurable FPGAs. The MCM will contain a simple radiation-hardened microcontroller and three (3) commercial flash nonvolatile memory (NVM) devices which have been radiation characterized. Our integrated device will support the needed standard interfaces that are commonly used for reconfiguring FPGAs, including Xilinx SelectMAP and JTAG. The output of our Phase II SBIR is a 32Gb device which meets at least 150Krads (Si) total dose. Space Micro has full capability to introduce and market this device into the international space business market.

Primary U.S. Work Locations and Key Partners

Rad Hard Non Volatile Memory for FPGA BootLoading, Phase II

Table of Contents

For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/17763

Organizations Performing Work	Role	Type	Location
Space Micro, Inc.	Lead Organization	Industry	San Diego, California
🟢 Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Transitions
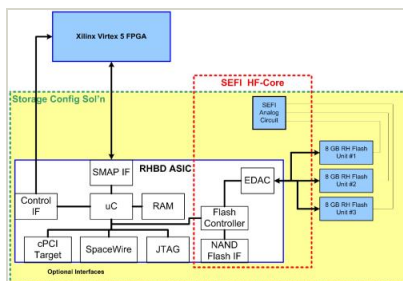
▶️ **April 2014:** Project Start

✅ **April 2016:** Closed out

> **Closeout Summary:** Rad Hard Non Volatile Memory for FPGA BootLoading, Phase II Project Image
>
> **Closeout Documentation:**
> - Final Summary Chart Image*(https://techport.nasa.gov/file/137438)*

Images

Briefing Chart Image
Rad Hard Non Volatile Memory for FPGA BootLoading, Phase II
(https://techport.nasa.gov/image/126415)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Space Micro, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:
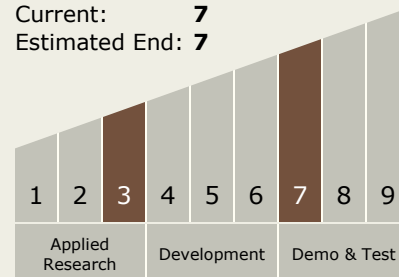
Bert R Vermeire

Co-Investigator:

Bert Vermeire

Technology Maturity (TRL)

Start: **3**
Current: **7**
Estimated End: **7**

1	2	3	4	5	6	7	8	9

Applied Research	Development	Demo & Test

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  └ TX02.1 Avionics Component Technologies
    └ TX02.1.4 High Performance Memories

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System